

Geographical Distribution of Indian Freshwater Fishes. —
Part II. The Siluridæ. By FRANCIS DAY, Esq., F.L.S.

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IN the first part of this paper¹ I gave an outline of the geographical distribution of the Acanthopterygian Freshwater fishes as existing in Sind, India, Burma, Ceylon, and the Andaman Islands. I now propose giving a similar sketch of the Sheat-fishes or Siluridæ², which form a large family amongst the Physostomi of Asia. Mostly scaleless, their mouths are provided with sensitive feelers, which, serving as organs of touch, assist them when seeking for their prey in turbid waters. Vision in such localities would be but of slight service; and, as might be anticipated, their eyes are comparatively small, whilst with advancing age these organs atrophy, not increasing so rapidly as the remainder of the body.

In addition to augmented facilities for feeling about in muddy water, they have a considerable development of the auditory organs, which doubtless must be of essential service.

The air-vessel or swim-bladder in fishes is found possessing two distinct functional offices. In the Acanthopterygians, destitute of a pneumatic duct, its use (excluding the question of its connexion with the internal ear) appears primarily to be a mechanical one, viz. for the purpose of maintaining a required level in the water and permitting the fish to rise or fall as desired.

In the majority of Carps (Cyprinina), in addition to the foregoing function, a pneumatic tube connects it with the pharynx, or upper portion of the alimentary canal, and also a chain of ossicles with the internal ear. In fact, it is employed both for hearing and flotation.

But in the Sheat-fishes (Siluridæ) the power of employing the air-vessel as a float appears to be subservient to that of hearing. Living, as they do, a life of ground feeders, this organ is more usefully restricted to acoustic purposes.

If we briefly consider where these fishes are found in Asia, it assists us in understanding this. Almost absent from the clear waters of the Red Sea³, they commence being numerous at the

¹ Journal Linnean Society, Zoology, vol. xiii. p. 138.

² The Anacanthini, having no solely freshwater representatives, do not call for remark.

³ *Arius thalassinus* and *Plotosus arab* are the only two species of Siluroids that have been recorded from the Red Sea.

more turbulent coasts of Beloochistan, at the mouths of the larger rivers and marine mud-flats off Sind and India, more especially Bengal and Burma. They are comparatively rare in the open sea; in fact at the Andamans they become scarce, except such species as reside where small streams empty themselves into muddy creeks. On the other hand, in the turbid sea near Moulmein and amongst the islands of the Mergui archipelago they abound.

In short, they resort to muddy waters; and in such places their feelers permit them to move about with ease, whilst their organs of hearing enable them to ascertain the vicinity of any enemy or the approach of some incautious prey.

We perceive the same thing amongst those inhabiting the fresh; the larger and muddier the rivers the more are they resorted to by Siluroids. Siluroids are found from the sea-coast to the base of the Himalayas; but as they generally deposit their ova in the waters of the plains, and not (like many Carps) in the rivers of the Subhimalayan range, they very sensibly diminish on nearing the hills. Still one or two species of *Callichrous* and a *Macrones* find their way into the hill-waters, where an *Amblyceps* and *Silurus*, as well as the mountain-torrent genera of *Pseudecheneis*, *Glyptosternum*, *Euglyptosternum*, and *Exostoma* find a congenial home. Those genera which are almost exclusively found in hill-streams are provided with an adhesive apparatus on the thorax, which, enabling them to adhere to stones, prevents their being carried away by the stream. As might be anticipated, their barbels are short, whilst in all the air-vessel is more or less enclosed in bone.

Reverting again to the air-vessel, we find it in Siluroids in two ways. In the marine forms it has an outer thick fibrous layer, and is attached to the lower surface of the bodies and transverse processes of some of the anterior vertebræ, whilst from it a chain of ossicles passes to the internal ear. As, however, we proceed inland or towards mountains a difference occurs, and in many genera the air-vessel becomes partially or entirely surrounded by bone. This may be effected by a trumpet-shaped extension of the lateral processes of the first or second vertebra, or else by an expansion of the most posterior of the auditory ossicles; but in either case the chain of bones is continued to the internal ear. The majority of those forms which have the air-vessels enclosed in a bony capsule being adapted to a mountain-torrent life leads me to conjecture that such may have some connexion with sound;

certainly such an organ, being almost incapable of expansion, would scarcely be of much service as a compressible float.

These fishes are generally well provided with weapons of offence¹ or defence; they have mostly strong dorsal and pectoral spines, often serrated and with which they can inflict dangerous wounds. This spinal armature is invariable in the marine and estuary forms, as there they are most called upon to resort to offensive or defensive measures. The auditory apparatus is more developed in the inland genera, where, instead of having to battle for their existence, they become the tyrants of the waters they inhabit.

Whether any East-Indian genera of Siluroids possess a distinct poison-apparatus or gland connected by a duct to a wound-inflicting-spine has not as yet been proved. But that most dangerous symptoms are occasioned by their dorsal and pectoral spines, is known not only to men but even to the lower animals.

On June 18th, 1869, I was present in Burma when the famous *Een-gay-gyee* lake was fished, which is done by placing a stationary weir across the water (which is a sort of river encircling an island); and a movable one is with great labour dragged up to it by large gangs of men, whose labours are continued for months. The final point had now been reached; and all round this enclosure nets were reared to about ten feet above the water to prevent the fish escaping², and which the captives, wild with alarm, were trying to

¹ Laws have been enacted in several countries rendering it penal to bring these fishes to the markets for sale with their spines intact. Omitting any consideration of the state of the health of the individual wounded, we find fishes occasion three distinct varieties of wounds:—

a. *Punctured wounds* inflicted by a spine destitute of a poison-gland or duct, as seen in the European Weevils (*Trachinus*) or the East-Indian *Polyacanthus*. But as distinct irritating effects extend for some distance from the wounded spot, and remain for a considerable period, it seems questionable whether some mucous or other substance causing these symptoms may not be present on the spine.

β. *Lacerated wounds*, such as may be caused by the dorsal or pectoral spines of Siluroids or the serrated spine on the tail of the Skates. In these cases also irritation may be occasioned by some mucous secretion.

γ. *Poisoned wounds*. The Siluroid *Thalassophryne* has been shown to have a distinct poison-gland leading up a canal existing in a serrated spine by which the wound is inflicted (Günther, P. Z. S. 1864, p. 155). The *Synanceia verrucosa* has also been shown to have a tube at each of its dorsal spines and a poison-gland at its base. The wounds, as might be anticipated, are very venomous.

² Salt for preserving them had not arrived.

jump over. Pelicans and cormorants were numerous and constantly devouring the spoil; but it was very curious to see how when fish sprang out of the water the birds opened their mouths, but sheered off to a respectful distance, evidently dreading the fall of the spined Siluroids on themselves. I have taken the sea-snake (*Enhydrina*) with the pectoral spine of an *Arius* projecting through its integuments from the intestinal canal.

There is also a difference perceptible in the manner in which some at least of Siluroids deposit their eggs. The marine and estuary *Arius* and its allies have large eggs; and as they are frequently found in the mouths of the males, whilst their intestines are destitute of food, it appears probable that they either carry them about in that manner for protection until hatched, or else remove them from what they consider to be a dangerous locality¹. In the freshwater species, on the contrary, we find the eggs very small; and the difference between those of the marine *Arius* and freshwater *Macrones* is very striking.

Regarding their respiration, I have already pointed out² that some, as *Saccobranchus* and *Clarias*, are truly amphibious, whereas I have no reason for believing that any of the other genera of Siluroids in India are so.

Amongst the Siluridæ, we know of thirty-one genera represented in India, Burma, and Ceylon; and of these we have twenty-six wholly or entirely confined to fresh water.

1. MACRONES³, *Dumeril*. The fishes of which this extensive genus is comprised extend through most parts of Asia, more especially in the tropics. They are numerous in the fresh waters of Sind, the whole of Hindustan, Ceylon, and Burma, and are common through Siam to the Malay archipelago.

2. LIOCASSIS⁴, *Bleeker*. Eastern Bengal and Assam to the Malay archipelago.

3. ERETHISTES⁵, *Müller & Henle*. These small fishes are found from Orissa and Bengal, through Assam and Burma. M'Clelland also records a species from Chusan.

4. RITA⁶, *Bleeker*. These fishes are found in the Indus and

¹ See paper by Prof. Turner, Camb. Jour. of Anat. and Zool. vol. i. p. 78.

² Journal Linn. Soc. Zool. vol. xiii. No. 68, p. 198.

³ Includes:—*Bagrus*, pt., Cuvier & Valenciennes; *Hypselobagrus*, *Hemibagrus*, *Pseudobagrus*, and *Aspidobagrus*, Bleeker.

⁴ Includes *Rama*, Bleeker; and see note to species.

⁵ Includes *Hara*, Blyth.

⁶ Includes *Gogrius*, Day.

its affluents, in the Jumna and Ganges, also in the Irawaddi in Burma to far above Mandalay.

5. PANGASIUS¹, *Cuvier & Valenciennes*. Larger rivers and estuaries of India and Burma to the Malay archipelago.

6. PSEUDEUTROPIUS², *Bleeker*. These fishes are common in the waters of Sind, India, Ceylon, and Burma, but at the Malay archipelago appear to be represented by a single species.

There is a very similar genus (*Eutropius*) separated from the foregoing owing to the position of its two pairs of mandibular barbels, the pair on either side being anterior to the inner ones, whereas in *Pseudeutropius* they arise on a transverse line.

All authenticated specimens of *Eutropius* are African; but one species, said to have come from India, was purchased in Liverpool and is in the British Museum. There is no other record of this one having been found in Africa, neither has it been brought from India by any other party; and, until rediscovered, the land which gave it birth may fairly be considered an open question.

Pseudeutropius, on the contrary, has not been found in Africa; and I believe that our present knowledge only warrants our considering the one genus African, the other Asiatic. I should mention here that a fossil fish has been discovered in the tertiary formation at Sumatra (deficient of its head), and has been assigned to this genus (Günther, *Geol. Mag.*, Oct. 1876).

7. OLYRA³, *McClelland*. These small fishes appear to be restricted, so far as we know, to the hills in Upper Assam and Pegu.

8. CALLICHOUS⁴, *Hamilton Buchanan*. Sind, India, Ceylon, Burma to the Malay archipelago and China.

9. WALLAGO, *Bleeker*. Sind, India, Ceylon, Burma to the Malay archipelago.

10. SILURUS⁵, *Artedi*. From Eastern Europe and Turkestan, along the Himalayas to Akyab, Tenasserim, Cochin China, the Malay archipelago, and China; also along the hills of the Malabar coast of India.

¹ Includes *Pseudopangasius* and *Helicophagus*, *Bleeker*.

² Includes *Clupisoma*, *Swainson*, *Schilbeichthys*, *Bleeker*.

³ Includes *Branchiosteus*, *Gill*.

⁴ Includes:—*Ompok*, *Lacépède*; *Kryptopterus*, *Kryptoptericthys*, *Micronema*, *Phalacronotus*, *Hemisilurus*, *Silurodes*, *Pseudosilurus*, and *Silurichthys*, *Bleeker*; *Pterocryptes*, *Peters*.

Parasilurus, pt., *Bleeker*.

11. CHACA, *Cuvier & Valenciennes*. Bengal, Assam, and Burma to the Malay archipelago.

12. CLARIAS¹, *Gronovius*. These amphibious fishes are found throughout Africa and Western Asia to India, Ceylon, Burma, Siam, the Malay archipelago, Hongkong, the Philippines, and beyond.

A nearly allied genus (*Heterobranchus*) is found in Africa; and Bleeker has discovered a species of it in the Malay archipelago.

13. SACCOBRANCHUS², *Cuvier & Valenciennes*. These are likewise amphibious fishes, but not found in Africa. They frequent the fresh waters of India, Ceylon, Burmah, to Cochin China, but have not been recorded from the Malay archipelago.

14. SILUNDIA, *Cuvier & Valenciennes*. These fishes frequent the large rivers of India and Burma.

15. AILIA, *Gray*. Sind, the larger rivers of the Punjab, N.W. Provinces, Bengal, Orissa, and Assam.

16. AILICHTHYS, *Day*. Indus and Punjab rivers, also Ganges and Jumna.

17. EUTROPICHTHYS, *Bleeker*. Large rivers of India and Burma.

18. AMBLYCEPS, *Blyth*. Himalayas, valley of the Ganges, Eastern Bengal, to Burma.

19. SISOR, *Hamilton Buchanan*. Indus, Jumna, and Ganges rivers.

20. GAGATA³, *Bleeker*. Sind, India (except its northern portion), Assam, and Burma.

21. NANGRA, *Day*. Sind, Deccan, N.W. Provinces, and Bengal.

22. BAGARIUS, *Cuv. & Valenciennes*. Larger rivers of India and Burma to Java.

23. GLYPTOSTERNUM⁴, *M'Clelland*. Hill-streams and rapid rivers of the plains of the Himalayan region, and India, to the Malay archipelago. Fishes of this genus are provided with an adhesive apparatus consisting of longitudinal folds of skin and placed between the bases of the pectoral fins on the thorax.

24. EUGLYPTOSTERNUM⁵, *Bleeker*. Syria, upper portions of

¹ Includes:—*Macropteronotus*, Lacépède; *Cossyphus* and *Phagorus*, M'Clelland.

² Includes *Heteropneustes*, Müller.

³ Includes:—*Batassio*, pt., Blyth; *Callomystax*, Günther.

⁴ Includes *Glyptothorax*, Blyth.

⁵ Includes *Aglyptosternon*, Bleeker.

the Jumna, and Upper Assam. This genus possesses an adhesive thoracic sucker, as in the last.

25. *PSEUDECHENEIS*, *McClelland*. Head waters of the Ganges and on the Himalayas, also the Khasya hills. Fishes of this genus have a very well-developed adhesive sucker on the chest, composed of transverse folds of skin.

26. *EXOSTOMA*¹, *Blyth*. Head waters of Indus, along the Himalayas and hilly districts to Assam, Pegu, Tenasserim, and the confines of China. Although these fishes have no adhesive sucker on their tuberculated chest, it is flattened, while the pectoral and ventral fins are evidently adapted for adhesion.

Examining the foregoing genera composing the freshwater Siluroids of India, we find that, of the 26 genera, 10 reach the Malay archipelago, 6 are restricted to India on the west, 6 to India and Burma, whilst *Erethistes* extends to China, *Saccobranchus* to Cochin China; and *Clarias* ranges from Africa, through Syria and India, to the Malay archipelago and beyond.

In short, out of 26 genera, 11 have Malayan and Chinese representatives, whilst only 1 has African; and this genus is common to the Malay archipelago.

I will now follow out the geographical distribution of each species, so far as such have been as yet recorded or have fallen under my own observation.

GENUS MACRONES.

1. *MACRONES CHRYSÆUS*, *Day*. Rivers in Canara and Malabar.

2. *M. AOR*², *Hamilton Buchanan*. Throughout the fresh waters of Sind, India, Assam, and Burma.

3. *M. SEENGHALA*³, *Sykes*. Sind, Salt range of Punjab, the Jumna and Ganges rivers, certainly as low as Delhi; the Deccan and Kistna river to its termination.

4. *M. BLYTHII*⁴, *Day*. Tenasserim.

5. *M. GULIO*⁵, *Hamilton Buchanan*. This is the only Indian species of this genus recorded as from the sea; it frequents estu-

¹ Includes *Chimarrichthys*, Sauvage.

² Includes:—? *Bagrus aorinus*, Val.; *B. aorides*, Jerdon.

³ Includes:—*Bagrus Lamarrii*, Cuv. & Val.; *B. aorellus*, Blyth.

⁴ Includes *Batasio affinis*, Blyth.

⁵ Includes:—*Bagrus albilabrus*, *fuscus*, *Birmannus*, and *abbreviatus*, Cuv. & Val.; *B. gulioides*, *melas*, *Schlegelii*, and *rhodopterygius*, Bleeker.

aries and tidal pieces of water as far as the Malay archipelago. Its ova are small, and like what obtain in the rest of the genus, and not similar to the large ova of the marine *Arius* and its allies.

6. *M. PUNCTATUS*, *Jerdon*. Bowany river at base of the Neilgherries in Madras.

7. *M. CORSULA*¹, *Hamilton Buchanan*. From Orissa, through Bengal and Assam.

8. *M. MICROPTHALMUS*, *Day*. Burma, along the course of the Irrawaddi.

9. *M. CAVASIUS*², *Hamilton Buchanan*. From Sind, throughout India, Assam, and Burma.

10. *M. TENGARA*³, *Hamilton Buchanan*. Northern India, Punjab, and Assam.

11. *M. OCULATUS*, *Jerdon*. Malabar coast and Coimbatore district.

12. *M. VITTATUS*⁴, *Bloch*. Sind, Indian Assam, Burma, Siam, and also Ceylon.

13. *M. LEUCOPHYSIS*, *Blyth*. Rivers of Burma.

14. *M. MONTANUS*⁵, *Jerdon*. Wynaad range of hills in Madras.

15. *M. KELETIUS*, *Cuv. & Val*. Madras and inland to Mysore and Coimbatore; also Ceylon.

16. *M. MALABARICUS*, *Day*. Malabar coast of India.

17. *M. ARMATUS*, *Day*. Malabar coast and western Ghauts.

18. *M. BLEEKERI*⁶, *Day*. Sind, Jumna, Ganges, and Burma.

Of the foregoing 18 species of *Macrones*, 2 have barbels not longer than the head, one (No. 1) is restricted to the Malabar coast, the second (No. 4) to Tenasserim. In all of the others the feelers reach at least to the ventral fin.

The following shows their distribution:—3 Malabar and west-

¹ Includes:—*Pimelodus menoda*, Ham. Buch.; *Bagrus trachacanthus*, Cuv. & Val.

² Includes *Pimelodus seengtee*, Sykes.

³ Includes:—*Pimelodus batasius*, Ham. Buch. (figure, not description); ? *P. anisurus*, M'Clelland.

⁴ Includes:—*Pimelodus carcio*, Ham. Buch.; ? *P. indicus*, M'Clelland; *Bagrus affinis*, Jerdon.

⁵ Includes ? *Bagrus agricolus*, Jerdon.

⁶ Includes:—*Bagrus keletius*, Bleeker; ? *B. tengara*, var., Blyth.

ern Ghauts; 4 western Ghauts or their bases, or through Mysore to Madras; 3 Sind, India, Assam, and Burma (1 also in Ceylon); 1 Deccan, Jumna, and Ganges rivers; 1 Sind, Jumna, Ganges, and Burma; 1 Northern India and Assam; 1 Bengal, Orissa, and Assam; 2 Burma; 1 Tenasserim; 1 coasts of Sind, India, Ceylon, and Burma.

Thus, if we exclude the half-marine *Macrones gulo*, we find 7 restricted to Malabar and Madras; 1 to the Deccan, Jumna, and Indus; 4 Indus, Ganges, Jumna, Brahmaputra, and Burma rivers; 2 locally in Bengal and Assam; 3 Burma.

GENUS LEIOCASSIS.

1. *L. RAMA*¹, *Hamilton Buchanan*. Eastern Bengal and Assam.

GENUS ERETHISTES.

1. *E. HARA*², *Hamilton Buchanan*. Orissa, Bengal, Assam, and Burma.

2. *E. CONTA*³, *Hamilton Buchanan*. Eastern Bengal, Assam, and Burma.

3. *E. JERDONII*, *Day*. Sylhet.

4. *E. ELONGATA*, *Day*. Naga hills.

These four species have a somewhat confined distribution, 2 extending from Orissa throughout Bengal, Assam, and Burma, and 2 being confined to the hills in the vicinity of Assam.

GENUS RITA.

1. *R. BUCHANANI*⁴, *Bleeker*. Indus, Jumna, and Ganges rivers and their affluents, Burma.

2. *R. PAVIMENTATA*⁵, *Val*. Deccan and Kistna river to its termination.

3. *R. CHRYSSEA*, *Day*. Orissa.

4. *R. HASTATA*⁶, *Val*. Deccan and Kistna river to its termination.

¹ Includes:—? *Pimelodus chandramara*, Ham. Buch.; *Silonia diaphina*, Swainson; *Rama Buchanani*, Bleeker.

² Includes:—*Erethistes pusillus*, Müller & Troschel; *Hara Buchanani*, Blyth.

³ Includes *Hara filamentosa*, Blyth.

⁴ Includes:—*Pimelodus rita*, Ham. Buch.; *Arius ritoides*, Cuv. & Val.; *Rita crucigera* (Owen), Günther.

⁵ Includes:—*Phractocephalus gogra*, Sykes; *Gogrius Sykesii*, Day.

⁶ Includes:—*Arius pumilus*, Val. (young); *Phractocephalus kuternce*, Sykes.

1 species is spread through the region of the Indus, Jumna, and Ganges rivers to Burma, 2 through the Deccan and Kistna river, and 1 appears to be restricted to Orissa.

Genus PANGASIUS.

1. *P. BUCHANANI*¹, *Cuvier & Valenciennes*. Large rivers of India, Assam, Burma, and perhaps the Malay archipelago.

Genus PSEUDEUTROPIUS.

1. *P. GOONGWAREE*², *Sykes*. Deccan, upper waters of Ganges and Jumna, Burma.

2. *P. TAAKREE*³, *Sykes*. Rivers of the Deccan and the Jumna.

3. *P. ACUTIROSTRIS*, *Day*. Rivers of Burma.

4. *P. MURIUS*⁴, *Hamilton Buchanan*. Rivers of Sind, Jumna, and rivers of Bengal and Orissa; also Assam.

5. *P. SYKESII*⁵, *Jerdon*. Malabar coast of India.

6. *P. ATHERINOIDES*⁶, *Bloch*. Sind, India (excluding the western coast and Assam).

7. *P. GARUA*⁷, *Hamilton Buchanan*. Throughout the larger rivers of Sind, India (except its most southern portion and the western coast), Assam, and Burma.

Of the foregoing seven species, 1 is spread through the Indus, Jumna, and Ganges to Bengal, Orissa, and Assam; 1 the same, but continued to Burma; 1 Sind, India (excluding the western coast), and Assam; 1 Deccan, Ganges, and Jumna, also Burma; 1 locally in Malabar; 1 restricted to Burma; and 1 restricted to the Malabar coast.

Thus 2 Indian forms are found in Burma; 1 Burman form appears to be restricted to that country, but to be a representative of an Indian form which does not extend to Burma.

Genus OLYRA.

1. *O. LONGICAUDA*, *M'Clelland*. Khasya hills.

¹ Includes:—*Pimelodus pangasius*, Cuv. & Val.; ? *P. djambal*, Bleeker.

² Includes *Eutropius macrophthalmus*, Blyth.

³ Includes *Pseudeutropius longimanus*, Günther.

⁴ Includes:—*Pachypterus melanurus*, Swainson; ? *Pseudeutropius megalops*, Günther.

⁵ Includes *Pseudeutropius Mitchelli*, Günther.

⁶ Includes:—*Pimelodus anguis* and *urua*, Ham. Buch.; *Pachypterus trifasciatus*, Swainson; *Bagrus exodon*, Bleeker.

⁷ Includes *Clupisoma argentata*, Swainson.

2. *O. BURMANICA*, Day. Pegu hills.

3. *O. LATICEPS*, M'Clelland. Khasya hills.

2 of these species are locally restricted to Assam and 1 to Pegu.

- Genus *CALLICHOUS*.

1. *C. GANGETICUS*, Peters. Ganges.

2. *C. SINDENSIS*, Day. River Indus.

3. *C. BIMACULATUS*¹, Bloch. Fresh waters of Sind, India, Ceylon, Assam, and Burma, to the Malay archipelago and beyond.

4. *C. PABO*², Hamilton Buchanan, Jumna and Ganges rivers, and Burma.

5. *O. MACROPHthalmus*³, Blyth. Madras, Assam, and Burma.

6. *O. MALABARICUS*, Cuvier & Valenciennes. Malabar coast of India.

7. *O. PABDA*⁴, Hamilton Buchanan. Indus and its affluents, Ganges, Jumna, Brahmaputra, and also Orissa.

These 7 species have a peculiar distribution: 1 is found from Sind through India and Ceylon to the Malay archipelago and beyond; 1 Indus, Ganges, Jumna, and Brahmaputra to Burma; 1 Ganges and Jumna and to Burma; 1 Madras, Assam, and Burma; 1 locally to Sind; 1 Malabar; 1 Ganges.

Genus *WALLAGO*.

1. *W. ATTU*⁵, Bloch. Throughout Sind, India, Ceylon, Assam, and Burma.

Genus *SILURUS*.

1. *S. WYNAADENSIS*, Day. Western Ghauts of India.

2. *S. AFGHANA*⁶, Günther. From Afghanistan along the Himalayas to Darjeeling.

¹ Includes:—*Ompok siluroides*, Lacépède; *Silurus checkra*, canius, and *duda*, Ham. Buch.; *S. microcephalus* and *mysoricus*, Cuv. & Val.; *Callichrus immaculatus*, *nebulosus*, and *affinis*, Swainson; *Silurus indicus*, M'Clelland; *Schilbe pabo*, Sykes; *Phalacronotus siluroides*, Bleeker; *Callichrous ceylonensis*, Günther.

² Includes *Callichrous nigrescens*, Day. ³ Includes *Callichrous notatus*, Day.

⁴ Includes:—*Silurus anastomus*, Cuv. & Val.; *S. lamghur*, Heckel; *Callichrus vittatus*, Swainson; *Cryptopterus latovittatus*, Playfair; *Callichrous Egertonii*, Day.

⁵ Includes:—*Silurus boalis*, Hamilton Buchanan; *S. wallago* and *asotus*, Cuv. & Val.; *Callichrus macrostomus*, Swainson; *Silurus Mülleri*, Bleeker; *Wallagoo Russellii*, Bleeker.

⁶ Includes *Silurus Dukai*, Day.

3. *S. COCHINCHINENSIS*¹, *Cuv. & Val.* Hills above Akyab, also Tenasserim to Cochin China.

Of these three species, 1 appears to be found along the Himalayas from Afghanistan to at least Darjeeling; 1 is spread from the hills above Akyab to Tenasserim and Cochin China; whilst the third is confined to the western Ghauts on the Malabar coast up to about 2500 feet elevation.

Genus CHACA.

1. *C. LOPHIOIDES*², *Cuvier & Valenciennes.* Ganges, Brahmaputra, and Irrawaddi rivers.

Genus CLARIAS.

1. *C. TEYSMANNI*³, *Bleeker.* Ceylon, Java.

2. *C. DUSSUMIERI*⁴, *Cuv. & Val.* Coasts of India and the Malay archipelago.

3. *C. MAGUR*⁵, *Hamilton Buchanan.* Throughout India and Burma to the Malay archipelago.

4. *C. ASSAMENSIS*, *Day.* Assam.

Of the 4 species of *Clarias*, 1 is generally distributed through India and Burma to the Malay archipelago; 1 Malabar and Madras to the Malay archipelago; 1 Ceylon and the Malay archipelago; 1 restricted to Assam.

Genus SACCOBRANCHUS.

1. *S. MICRUPS*, *Günther.* Ceylon.

2. *S. FOSSILIS*⁶, *Bloch.* Fresh waters of Sind, India, Ceylon, Assam, Burma, and Cochin China.

Genus SILUNDIA.

1. *S. SYKESII*⁷, *Day.* Rivers of Deccan and throughout the Kistna and Godavery.

¹ Includes *Silurichthys Berdmorei*, Blyth.

² Includes:—*Platystacus chaca*, Hamilton Buchanan; *Chaca Buchananii*, Günther.

³ Includes? *Clarias brachysoma*, Günther.

⁴ Includes *Clarias melanosoma*, Bleeker.

⁵ Includes:—*Silurus batrachus*, Bloch; *S. anguillaris*, Russell; *Clarias marpus* and *punctatus*, Cuv. & Val.

⁶ Includes:—*Silurus singio*, Ham. Buch.; *S. laticeps* and *biserratus*, Swainson; *Saccobranchus microcephalus*, Günther.

⁷ Includes? *Ageneiosus childreni*, Sykes.

2. *S. GANGETICA*¹, *Cuv. & Val.* .Larger rivers of India and Burma.

Of these two species, 1 appears to be restricted to the Deccan rivers, the other is spread through the larger rivers of India and Burma.

Genus AILIA.

1. *A. COILA*², *Hamilton Buchanan.* Sind, the large rivers of the Punjab, N.W. Provinces, Bengal, Orissa, and Assam.

Genus ALLIICHTHYS.

1. *A. PUNCTATA*, *Day.* Indus, rivers of the Punjab, and upper portions of the Ganges and Jumna.

Genus EUTROPIICHTHYS.

1. *E. VACHA*³, *Hamilton Buchanan.* From the Punjaub, through the large rivers of Sind, Bengal, and Orissa; whilst a variety (*E. Burmanicus*) is found in Burma.

Genus AMBLYCEPS.

1. *A. MANGOIS*⁴, *Hamilton Buchanan.* Along the Himalayas commencing at the Punjaub, in the Jumna for some considerable distance from the hills, also through Burma to Moulmein.

Genus SISOR.

1. *S. RHABDOPHORUS*, *Hamilton Buchanan.* Indus, Ganges, and Jumna rivers, as low as Bengal and Behar.

Genus GAGATA.

1. *G. CENIA*⁵, *Hamilton Buchanan.* Indus, Ganges, and Jumna rivers; also rivers of Orissa and Burma.

2. *G. ITCHKEEA*, *Sykes.* Rivers of the Deccan.

3. *G. BATASIO*, *Ham. Buch.* River Testa.

4. *G. TENGANA*, *Ham. Buch.* Assam.

¹ Includes;—*Pimelodus silondia*, Ham. Buch.; *Silonia lurida*, Swainson.

² Includes:—*Silurus Cuvieri*, Gray; *Malapterus bengalensis*, Gray; *Acanthonotus Hardwickii*, Gray; *Ailia affinis*, Günther.

³ Includes *Pachypterus punctatus*, Swainson.

⁴ Includes:—*Amblyceps cæcutiens* and *A. tenuispinus*, Blyth; *Akysis Kurzii*, Day.

⁵ Includes:—*Pimelodus gagata*, Ham. Buch.; *Gagatatypus*, Bleeker.

Genus NANGRA.

1. *N. BUCHANANI*¹, Day. Indus, Ganges, and Jumna rivers.
2. *N. PUNCTATA*, Day. Sone river.
3. *N. IRIDESCENS*, Ham. Buch. North Bengal and Deccan.

Genus BAGARIUS.

1. *B. YARRELLII*², Sykes. Large rivers of Sind, India, and Burma to the Malay archipelago.

Genus GLYPTOSTERNUM.

1. *G. LONAH*³, Sykes. Poona and rivers of Deccan, also the Jumna near its upper portion.
 2. *G. TRILINEATUM*⁴, Blyth. Nepaul, Burma, and Tenasserim.
 3. *G. CONIROSTRE*, Steindachner. Himalayas from affluents of the Indus and Jumna, as at Kangra and Simla.
 4. *G. BOTIA*, Hamilton Buchanan. From the Jumna after it leaves the Himalayas; common about Delhi.
 5. *G. TELCHITTA*, Hamilton Buchanan. Ganges and Jumna rivers from the Himalayas as low as Bengal and Behar.
 6. *G. STRIATUM*, M'Clelland. Khasya hills in Assam.
 7. *G. MADRASPATANUM*⁵, Day. Bowany river at the foot of the Neilgherry hills.
 8. *G. PECTINOPTERUM*⁶, M'Clelland. Himalayan region from affluents of the Indus, Jumna, and Ganges; found from Nangra and Simla to certainly as far as Darjeeling.
 9. *G. CAVIA*, Hamilton Buchanan. Rivers of northern Bengal.
- These fishes appear to have a somewhat local distribution, 1 species being restricted to the Jumna and Deccan, one to southern Madras, 3 to the Himalayas (one of which is likewise found in Burma), 1 to the Khasyas in Assam, and 3 to the Jumna, Ganges and rivers of northern Bengal.

¹ Includes *Pimelodus nangra*, Ham. Buch.

² Includes:—*Pimelodus bagarius*, Ham. Buch.; *P. platespogon*, Val.; *P. car-naticus*, Jerdon; *Bagarius Buchananii*, Bleeker.

³ Includes *G. dekkannense*, Günther.

⁴ Includes *G. gracile*, Günther.

⁵ I cannot detect any air-vessel in this species.

⁶ *G. Stoliczkae*, Steindachner (adult); *G. modestum*, Day (young)

Genus EUGLYPTOSTERNUM.

1. *E. LINEATUM*, *Day*. Head waters of the Jumna. Upper Assam; from the neighbourhood of the Himalayas.

Genus PSEUDECHENEIS.

1. *P. SULCATUS*, *M'Clelland*. Darjeeling and Khasya hills.

Genus EXOSTOMA.

1. *E. LABIATUM*, *M'Clelland*. Mishmee Mountains in East Assam.

2. *E. BLYTHII*, *Day*. Darjeeling.

3. *E. BERDMOREI*, *Blyth*. Tenasserim.

4. *E. STOLICZKÆ*, *Day*. Head waters of Indus.

The foregoing 85 species of Indian freshwater Siluroid fishes are thus distributed.

| | |
|--|---|
| Indian region ¹ | 1 |
| " to Malay archipelago | 5 |
| " (excluding Sind) to Burma | 5 |
| " Ceylon and Burma | 1 |
| " (excluding Southern India and Malabar) | |
| to Burma..... | 2 |
| " (excluding Southern India and Malabar) | |
| to Assam..... | 1 |
| " (excluding Southern India and the Deccan) | |
| to Assam..... | 3 |
| " (excluding Southern India and the Deccan) | |
| to Burma | 2 |
| " to Cochin-China | 1 |
| Indus, Ganges, and Jumna rivers | 3 |
| Indus..... | 1 |
| Ganges, Jumna, and the Deccan | 4 |
| " " " to Burma | 1 |
| Deccan | 4 |
| Bengal | 6 |
| Bengal, Orissa, and Assam | 1 |
| " " " to Burma | 1 |
| Bengal, and Assam to Burma | 3 |
| " " " | 1 |
| " and Burma | 2 |
| Himalayan region..... | 6 |
| " " and Burma..... | 1 |

¹ This includes India, Sind, and the Punjaub only.

| | |
|---|---|
| Burma | 1 |
| " and Cochin-China | 1 |
| Assam | 8 |
| Orissa | 1 |
| Madras, Assam, and Burma..... | 1 |
| Base of Neilgherry hills in Madras | 2 |
| South India and Malabar | 1 |
| " Ceylon | 1 |
| Ceylon | 1 |
| " and Java | 1 |
| West coast of India and Malay archipelago | 1 |
| " " | 6 |
| " " and Coimbatore | 1 |

The foregoing shows that the 78 species are restricted to the Indian region (including Burma and Ceylon); 6 are distributed from the Indian region (excluding Ceylon) to the Malay archipelago, and 1 extends from Ceylon to the Malay archipelago. Consequently we find no species of Indian freshwater Siluroid extending its range to Africa, whereas 6 do to the Malay archipelago.

Of the genera, as I have already remarked, only 1 is common to India and Africa, whilst that is also found in the Malay archipelago, which possesses 10 more Indian genera.

So far, results would appear to show us that the present race of freshwater fishes of India is much more closely related to a Malayan than it is to an African fish-fauna.

Notes on the Genus *Alveolites*, Lamarck, and on some allied Forms of Palæozoic Corals. By Prof. H. ALLEYNE NICHOLSON, M.D., D.Sc., F.R.S.E., F.L.S., and ROBERT ETHERIDGE, Jun., F.G.S.

[Read May 3, 1877.]

(PLATES XIX. & XX.)

WE have recently had occasion to examine a large series of specimens of that group of corals to which the name of "*Alveolites*" is generally given, as well as of various allied forms, from the Carboniferous rocks of the north of England and south of Scotland, the Devonian rocks of Devonshire and North America, and